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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/689,114 | 10/12/2000 | Hideo Shibahara | NEKW 17.876 | 6403 |

7590 06/15/2005

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| CALEY, MICHAEL H | |
| **ART UNIT** | **PAPER NUMBER** |
| 2871 | |

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/689,114 | SHIBAHARA, HIDEO | |
| | Examiner | Art Unit | |
| | Michael H. Caley | 2871 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-4 and 6-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-4, 6-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**Claims 1, 2, 10, 11, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto et al. (U.S. Patent No. 6,281,960 "Kishimoto") in view of Murouchi (U.S. Patent No. 6,607,144) and Kajita et al. (U.S. Patent No. 6,275,280 "Kajita").**

Regarding claims 1, 2, and 15, Kishimoto discloses a liquid crystal display panel (100) and a process for fabricating such a panel, comprising a pair of substrate structures (20, 40) having plural pixels (22) where an image is produced, liquid crystal (54) filling a gap between the substrate structures of the pair and selectively making the pixels dark and bright for producing the image, and column spacers (108) formed on one of the substrate structures (40) and held in contact with the other of the substrate structures (20, Figures 1-7). Kishimoto discloses that the pixel size is about 320 X 320 micrometers and the size of the column spacers (108) is about 20 X 30 micrometers (Figure 7). Hence the ratio of the total contact area between the column spacers and the other of the substrate structures to the total area occupied by the plural pixels being 0.06% as disclosed by Kishimoto. Kishimoto also discloses a process of fabricating such a panel (Columns 13 and 14), as recited in claim 15 and the column spacers as respectively associated with the pixels (Figure 7), as recited in claim 2.

Kishimoto fails to explicitly discloses a sealing layer as formed between the matrix of plural pixels and a peripheral area such that none of the column spacers are formed in an area of the sealing layer. Murouchi, however, teaches a sealing layer at the periphery of the upper and lower substrates (abstract, Column 3 lines 27-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a sealing layer between the matrix of plural pixels and a peripheral area in the display device disclosed by Kishimoto. One would have been motivated to form such a sealing layer to benefit from the conventionally known advantages of such a layer such as its ability to maintain the placement of the liquid crystal layer and to prevent contamination of the liquid crystal.

Furthermore, Kishimoto discloses the column spacers as formed within the matrix of plural pixels. Murouchi teaches the sealant placed according to conventional means at a periphery of the substrates outside of the matrix of plural pixels. The column spacers disclosed by Kishimoto therefore would not have been placed within the sealing material when the sealing material is placed according to conventional methods of the art, such as taught by Murouchi.

Note that the range for the contact area as disclosed by Kishimoto is larger than the range of about 0.05 to 0.150% (proposed in claims 1 and 15). However, the recited range in the instant claim 1 is considered to be within the optimization range. Therefore, the range in claims 1 and 15 would have at least been obvious. See In re Malagari, 299 F.2d 197, 182 USPQ 549 (CCPA 1974).

As to the limitation in the amended claims 1 and 15 "at least one of said column spacers being formed between adjacent pixels of said pixels, Kishimoto does teach that the column

spacers (polymer walls) 12b and 12b' having different heights are formed at the periphery of corresponding pixels (col. 10, lines 14-17 and 33-34). Kishimoto's pixel area consists of R,G,B sub-pixels. Hence the pixel region is in between the walls 12b' and 12b. Hence being at the periphery of the corresponding pixels as taught by Kishimoto, the column spacers are adjacent to the pixel area.

In addition, Murouchi clearly teaches that the column spacers 4a and 4b are formed between adjacent pixels (3a, 3b, and 3c) of the plural pixels.

Therefore, it would have been obvious to one having ordinary skill in the at the time the invention was made to further modify the Kishimoto LCD device with a ratio as recited in order to enhance the display area by reducing either the number of spacers or by reducing the contact ratio of the spacers to enhance the viewing angle as well as having excellent display quality (col. 5, lines 61-65) and further modify the device using the teachings of Murouchi as to the arrangement of the column spacers between adjacent pixels to provide a rigid liquid crystal display cell with superior productivity and durability (col. 2, lines 1 3- 1 5).

In Fig. 3 Mirouchi clearly shows that the column spacers (4a) which are in contact with the substrates, are formed within a matrix of plural pixels named R,G,B. Since Fig. 3 is a cross-section of the device, it does not explicitly show the matrix nature of the plural pixels (R,G,B) that are formed by rows and columns. However, in a two-dimensional depiction of Fig. 3 the matrix formation of the plural pixels is inherent.

In case, if the Applicant does not agree with the Examiner's analysis of the matrix of pixels, as explained above, such a matrix formation for the plural pixels is explicitly shown by

Kajita. In Fig. 6-8, Kajita teaches column spacers (24) formed within a matrix of plural pixels (R,G,B) that are formed by rows and columns.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the Kishimoto and Murouchi device to maintain a uniform cell cap within the display screen and the display quality is not reduced when subjected to a force or impact from outside or when a change in cell temperature occurs (Kajita, col. 2, lines 10-15).

Regarding claims 10 and 11, Kishimoto discloses that each of the column spacers (108) is associated with pixels selected from plural pixels (22). However, Kishimoto does not disclose that the column spacers are classified into two groups one of which is taller than the other. Murouchi on the other hand, in disclosing LCD cell discloses two supporting members (4 and 5) having column shapes with different heights one being taller than the other (Fig. 3).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the Kishimoto LCD panel with that of Murouchi having column spacers with two different heights in order to reduce the problems due to the width changes identified in the prior art discussion (col. 1, lines 11-67) and provides a rigid liquid crystal display cell with superior productivity and durability (col. 2, lines 13-15).

**Claims 3, 5, 12, 14, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Murouchi and Kajita and in further view of Mashiko et al. (U.S. Patent No. 6,288,766 "Mashiko").**

a. As to claims 3 and 5: Kishimoto discloses additional column spacers (108) formed outside said plural pixels. Murouchi also discloses a sealing layer formed between the pixels and a peripheral area (Col. 5, line 7).

b. As to claims 12,14 and 16-18: Although Kishimoto discloses a process of fabricating the panel, Kishimoto does not disclose a reservoir, a pressure adjusting means or evacuation of the liquid crystal.

However, Mashiko in disclosing a liquid crystal display device discloses a method of manufacture and a method for injecting the liquid crystal material, pressure adjusting means (Col. 10, line 19) and the alignment and sealing of the two substrates. Mashiko also discloses a reservoir (62) (Col. 1, lines 26-38) and the pressure being from vacuum to .01 and l-50 torr (Col. 11, lines 57-60) that is less than the atmospheric pressure as recited in claim 14. When atmospheric pressure being equal to 1 10,000 N/m2 and also equals to approximately 760 torr (the applicant is requested to refer to any text book in Physics for these conversion factors), it would have been obvious to one having an ordinary skill in the art to convert the above units to come up with the recited features of 0/01 N/m2 to 6KN/m2 as recited in claims 16 and 17. Since the cell is still being assembled when the pressure is being applied, there is no electrical power and the room temperature operation is disclosed in abstract and elsewhere.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adapt the method of fabricating the device as disclosed by Mashiko to the display device of Kishimoto and Murouchi to inject the liquid crystal material into the cell in a short time without deforming or damaging the cell while eliminating an occurrence of

unwanted deficient injection of the liquid crystal, bubbles and cavitation (Col.3, lines 43-47 of Mashiko).

**Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Murouchi, Kajita, and Mashiko, and in further view of Nishino et al. (U.S. Patent No. 6,010,384 "Nishino").**

Kishimoto as modified by Murouchi, Kajita, and Mashiko fails to discloses additional column spacers formed outside the matrix of the plural pixels such that the additional column spacers are formed in the peripheral areas. Nishino, however, teaches columnar spacers formed in the peripheral area outside the sealing material in addition to the column spacers formed in the matrix of plural pixels (Column 6 lines 18-28, Column 11 lines 8-12; Figures 5, 8, and 10F) as a means of reducing defects that occur during separation of individual panels during the cutting process (Column 2 lines 35-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed additional column spacers outside the matrix of plural pixels in the peripheral areas. One would have been motivated to place additional column spacers accordingly to prevent cut defects and reduction of manufacturing yield due to such defects (Column 2 lines 46-50).

**Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Murouchi and Kajita and further in view of Ishikawa et al. (U.S. Patent No. 6,414,733 "Ishikawa").**

Kishimoto discloses common electrode (34), but Kishimoto does not explicitly disclose switching elements and the connection of these switching elements to the pixel electrodes. Ishikawa on the other hand, in disclosing a liquid crystal display device not only discloses column spacers, switching elements TFT (23), pixel electrodes but also discloses the use of common electrode (22) on one of the substrates. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adapt the switching elements, common electrode as disclosed by Ishikawa to the LCD disclosed by Kishimoto to enhance the display efficiency and contrast ratio.

**Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Murouchi, Kajita, and Ishikawa and further in view of Ogura et al. (U.S. Patent No. 5,739,888 "Ogura").**

Kishimoto and Ishikawa disclose column spacers but not spherical spacers or reinforcement spacers in the sealing layer or the specific relationship between the diameter of the spacer to the thicknesses of the various films.

Ogura discloses a sealing layer (28) spacers (30) and the relationship of the diameter of the spacer to the thicknesses of various films (Col. 6, line 50-65 and col. 9, lines 35-54). Ogura also discloses that the particle diameter of the spacers (11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adapt the specified thickness relationship as disclosed by Ogura to the display device as recited in instant claims so as to provide a display element which is free from irregularities in luminance in its effective display area and has uniform display quality (Col. 3,

lines 32-34 of Ogura).

***Response to Arguments***

Applicant's arguments filed 3/9/05 have been fully considered but they are not persuasive.

Regarding the rejection of claim 1 as unpatentable over Kishimoto in view of Murouchi and Kajita, Applicant argues that the amended claim language overcomes the rejection because the references fail to exclude column spacers from the sealing layer.

At the outset, it is noted that the claim language of claim 1 does not preclude column spacers from existing in the sealing layer as argued. The claim language introduces a group of "column spacers...the ratio of the total contact area between said column spacers...within the range from 0.050 percent to 0.150 percent, at least one of said column spacers being formed within a matrix of said plural pixels" and further states "none of said column spacers being formed in an area of said sealing area". Such language does not preclude a group of "additional column spacers" from being formed in the sealing layer. For example, claims 4 and 13 introduce a group of "additional column spacers" to which the limitations of the spacers of claim 1 do not apply. Therefore, it is only necessary that Kishimoto disclose a plurality of column spacers having the properties of claim 1 that are not located in the sealing material. It is irrelevant whether Kishimoto explicitly exclude all column spacers from existing in the sealing layer.

Kishimoto discloses a plurality of column spacers as provided in the liquid crystal region (Column 7 line 50 – Column 8 line 2). Murouchi teaches a conventional sealing layer as surrounding the liquid crystal region (abstract, Column 3 lines 27-40). Accordingly, the column

spacers disclosed by Kishimoto would inherently not appear in the sealing material when combined with a conventional sealing material as taught by Murouchi.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### *Contact Information*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael H. Caley whose telephone number is (571) 272-2286. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael H. Caley
June 11, 2005
mhc

DUNG T. NGUYEN
PRIMARY EXAMINER